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[54] **SUPPORT APPARATUS FOR DISTRIBUTOR MEANS**
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193/3, 193/17
 [51] Int. Cl. **B65g 65/32**
 [50] Field of Search **214/17.6,**
17.64; 193/3, 17; 302/60

[56] **References Cited**

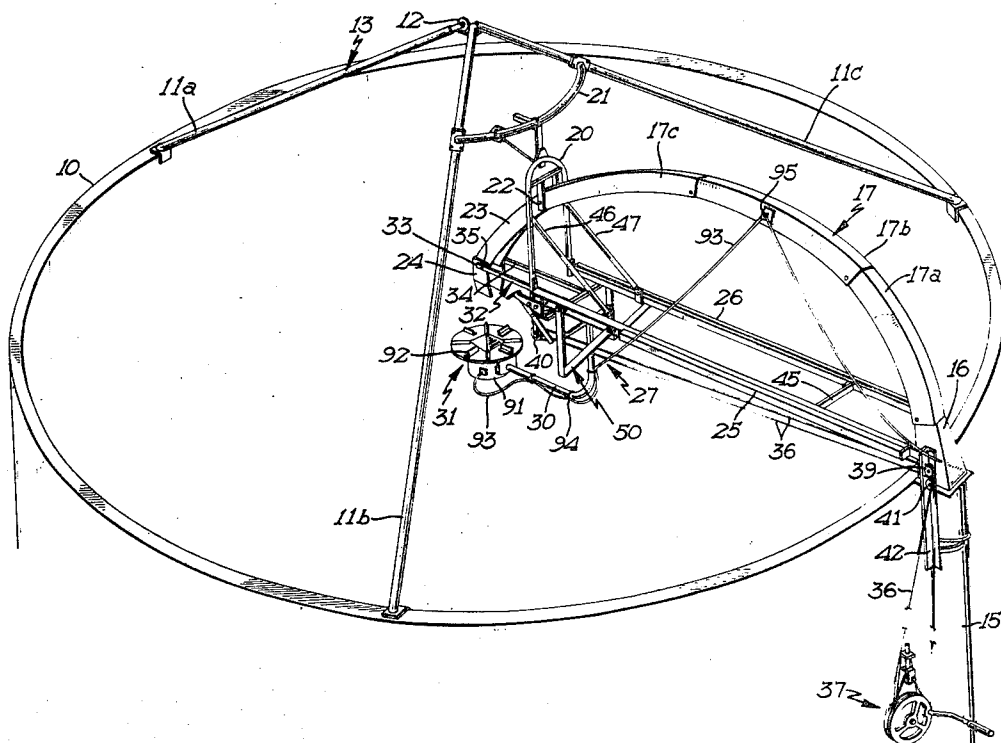
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ABSTRACT: Support means mounted at the top of a tower silo for supporting a silage distributor and including a pair of rails extending generally radially inward from one edge of the silo to a position short of the center of the silo and with this inner end supported from a tripod which is mounted on top of the silo. A gooseneck or guide means is fixed directly above the rails and extends inwardly to a position approximately equal to the inner end of the rail. Hinged to this inner end of the fixed guide means is a collapsible portion which can be extended to a position approximately at the center of the silo or collapsed to a position short of the center of the silo. A carriage is movable back and forth on the rails and has an arm on which a silage distributor is mounted. Movement of the carriage on the rails to a position where the distributor is positioned at the center of the silo causes movement of the collapsible portion of the guide means to its extended position where it is latched, allowing the carriage to be moved in a direction away from the center of the silo and out of the trajectory of material being put into the silo, allowing the center to be filled, while the collapsible portion remains extended. A trip apparatus is provided whereby movement of the carriage to a predetermined position near the wall of the silo results in unlatching of the collapsible guide means permitting it to collapse. When the carriage is retracted towards the wall of the silo and the collapsible guide means is collapsed, there is sufficient room so that a silo unloader suspended from the tripod, at the center of the silo, can be moved past the inner end of the rail and the guide means. When the carriage is moved back to the wall, the arm which carries the distributor also is disposed at the wall for easy servicing and removal.



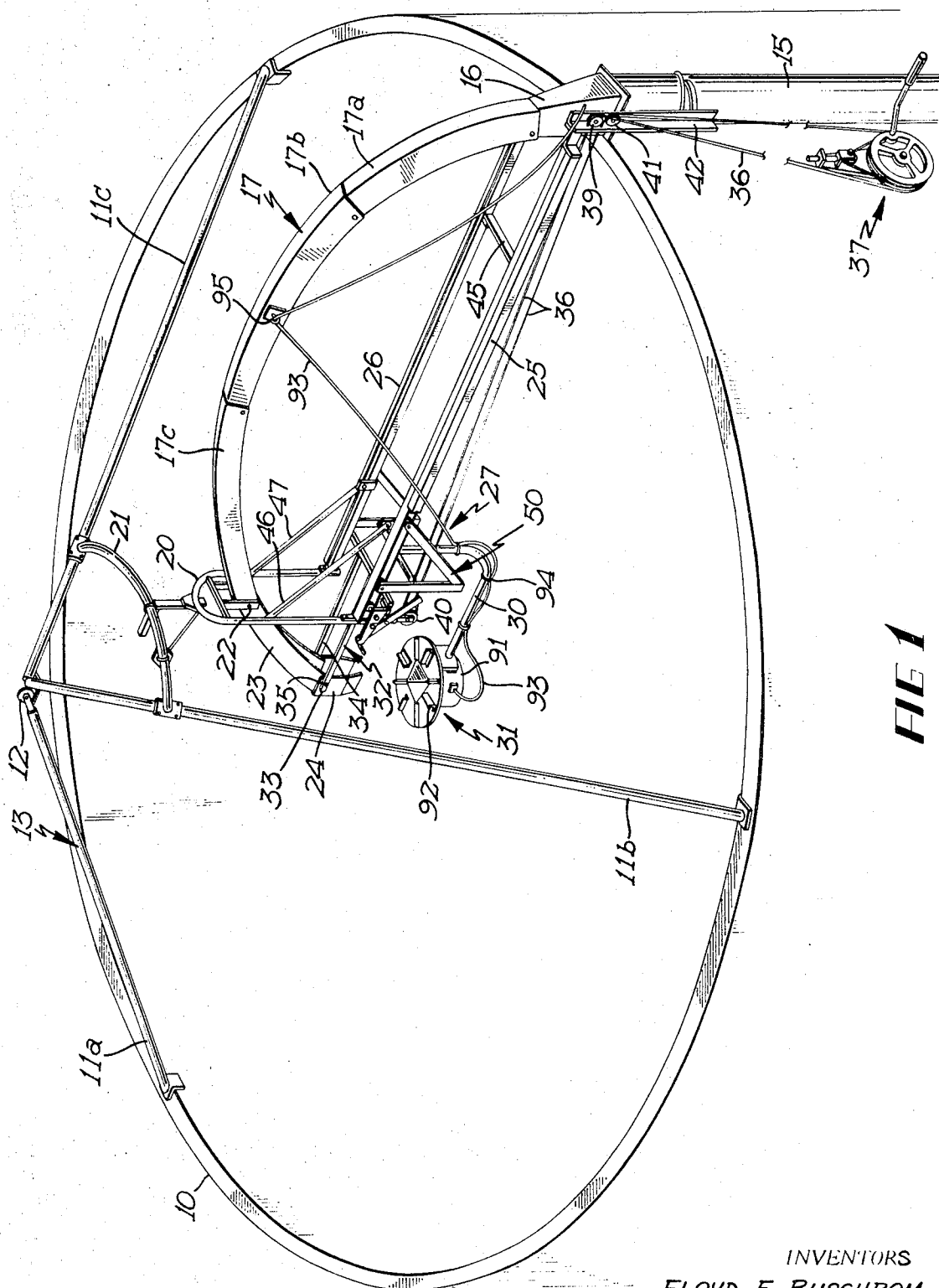
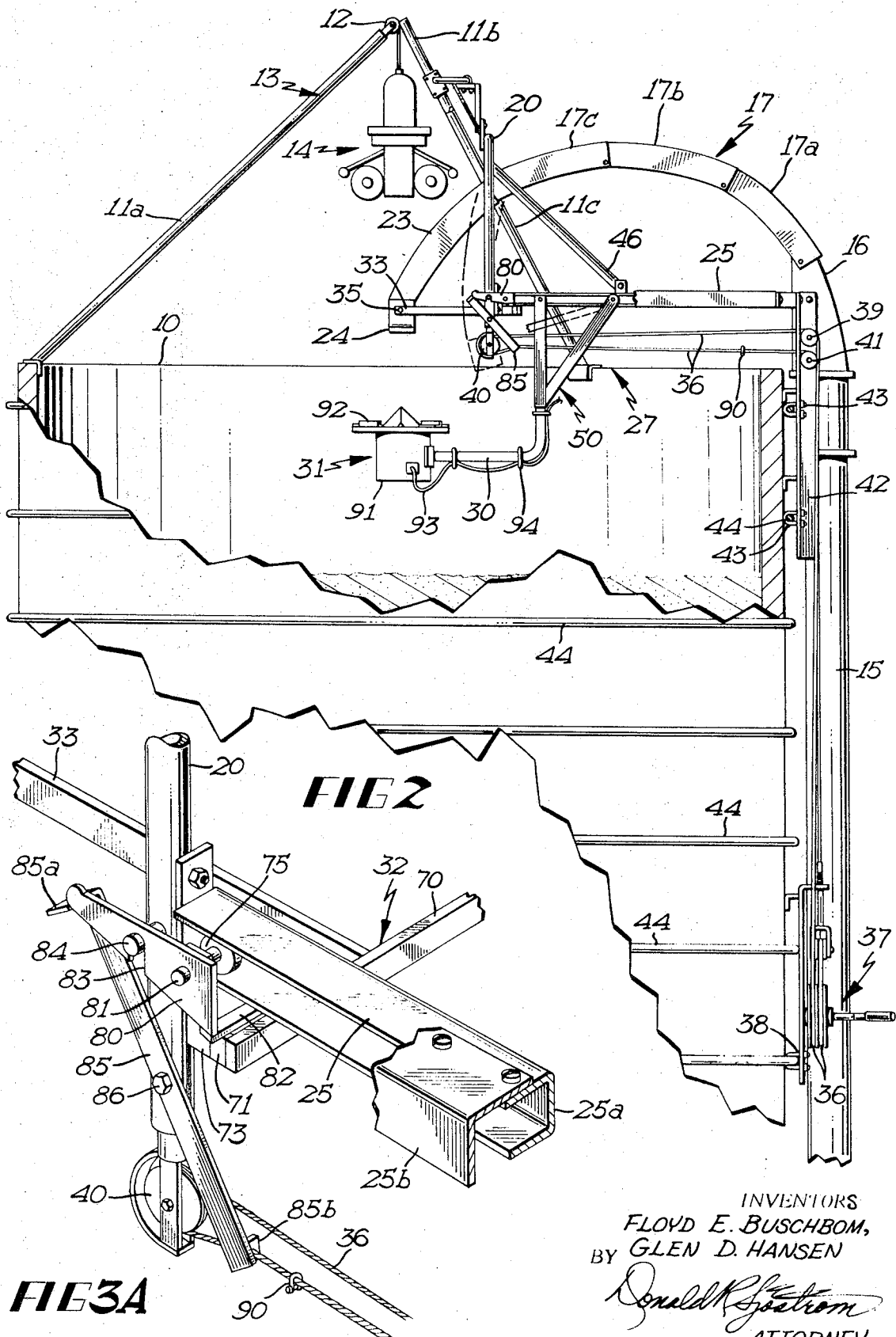


FIG 1

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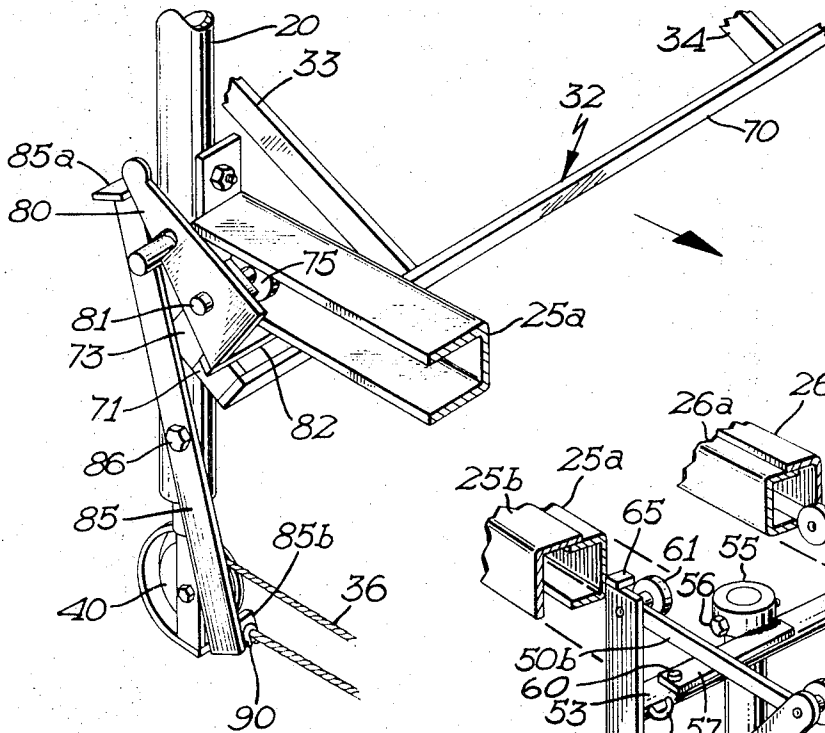


FIG 3B

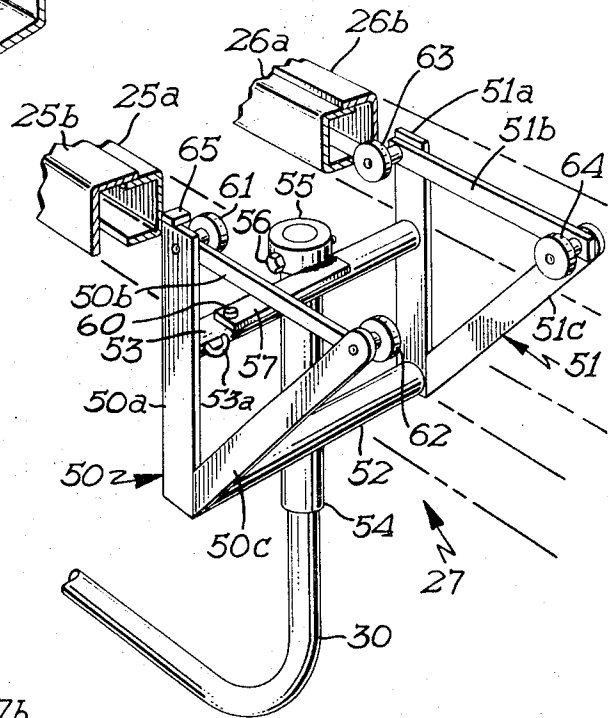


FIG 4

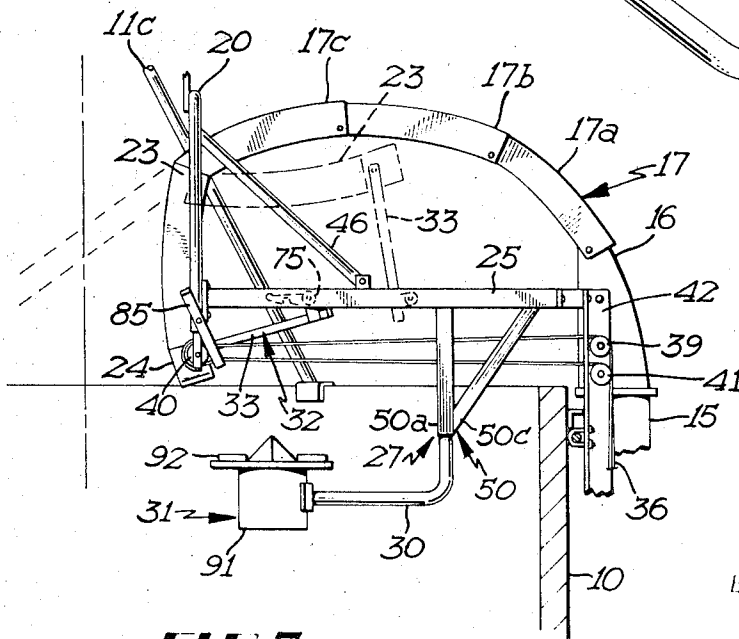


FIG 5

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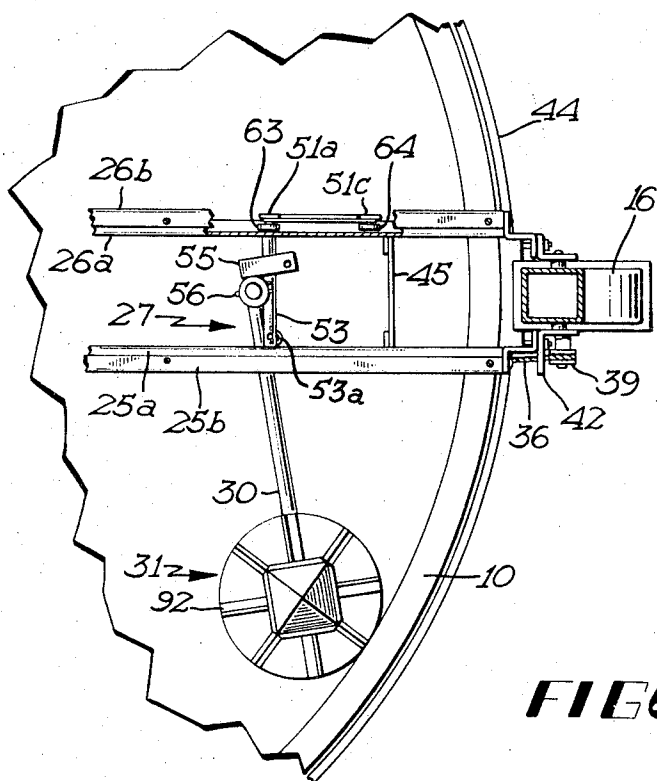


FIG 6

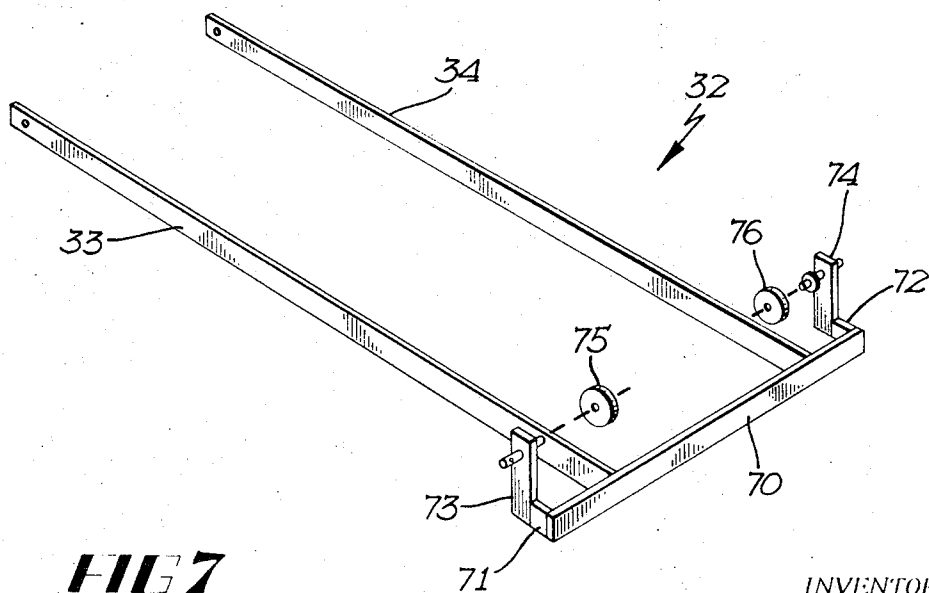


FIG 7

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SUPPORT APPARATUS FOR DISTRIBUTOR MEANS

BACKGROUND OF INVENTION

This invention relates to support means for a particulate distributor, particularly for use with tower silos and for mounting a silage distributor therein. Many types of silage distributors are presently being used in an effort to evenly distribute the silage in a silo to prevent separation of the constituents of the silage and to avoid placing undue stress on the silo structure due to uneven loading. Generally these distributors are mounted at the center of the silo in a position wherein silage is directed from the gooseneck onto them. While various types of hangers and supports have been proposed for these distributors, various problems have been encountered. Some prior structures have interfered with the flow of silage from the gooseneck onto the distributor. Generally the distributor distributes material toward the wall of the container leaving the center to be filled largely by material rolling inward from near the walls and often resulting in the center not being adequately filled. Since the distributors were generally fixed in position, they could not be moved out of the stream of material to properly fill the center. In many the distributor could not readily be reached so that it could be serviced or removed except when the silo was full. Generally it is desired to mount this support structure in the silo permanently but most silos also use a silo unloader, the most popular type of which is suspended centrally of the silo from a tripod mounted at the top of the silo. When the silo is to be filled this silo unloader is hoisted to the top where it remains suspended until the silo is full. Many prior supports for silage distributors have had the disadvantage that they interfere with the movement of the silo unloader up and down in the silo past the support structure. Many prior units have also interfered with filling the last few feet of the silo because of their inflexibility. Furthermore, most of the prior structures have been relatively complex and in many cases very heavy and difficult to install.

BRIEF SUMMARY OF INVENTION

This invention provides an improvement in support apparatus for supporting a distributor for particulate material in a container, such as a silage distributor mounted in a tower silo and which avoids the disadvantages noted above. In its broadest sense, the apparatus includes frame means extending at least a part of the way across the container (silo) and a fixed guide means such as a gooseneck, also extending a portion of the way across the container and having at its remote end a collapsible portion which is movable between an extended position and a collapsed position. The frame means has mounted thereon a distributor carrying means which is movable along the frame means. A further means operably connects the distributor carrying means and the collapsible portion of the guide means whereby predetermined movement of the distributor carrying means on the frame means causes movement of the collapsible portion of the guide means between its extended and collapsed positions.

In a preferred arrangement the frame means includes a pair of rails extending generally radially inward toward the center from one wall of the silo and terminating at a position short of the silo center. Fixed guide means extends substantially to the same position and the distributor carrying means includes means movable toward and away from the center of the silo along the rail and includes means whereby the distributor is positioned substantially at the center of the silo when the distributor carrying means is disposed at a position substantially at the inner end of the rail. The means operably connecting the distributor carrying means and the collapsible portion of the guide means includes means moving the collapsible guide means to its extended position when the distributor is moved to a position substantially at the center of the silo and in a position where material will be directed onto it by the collapsible portion of the guide means in its extended position. A latching means latches the collapsible portion in this extended position, retaining it and permitting movement of the distribu-

tor carrying means back toward the wall so that the distributor may be moved out of the path of material to permit direct filling of the center of the silo. Further means is providing for unlatching the collapsible guide means when the distributor carrying means is moved to a predetermined position, generally relatively close to the wall of the silo, this unlatching permitting the collapsible guide means to move to its collapsed position spaced from the center of the silo. In a preferred arrangement the frame means and the guide means are constructed so that when the guide means is in its collapsed position, it is sufficiently spaced from the center of the silo to permit movement of a centrally suspended silo unloader past it. Also in the preferred form, the structure is constructed so that when the distributor carrying means is retracted to a position near the wall, the collapsible guide means may be moved from its normal collapsed position to a further retracted position wherein it is disposed completely out of the trajectory of material passing through the end of the fixed guide means. Preferably the distributor carrying means includes a carriage movable along the rails with a movable arm normally extending radially therefrom toward the center of the silo, this arm being releasable and then rotatable so that when the carriage is retracted substantially to the wall of the silo, the arm may be rotated to also position the distributor carried thereby substantially at the wall of the silo for servicing or removal.

The structure is relatively simple, relatively light in weight, and does not interfere with vertical movement of a silo unloader suspended from a tripod at the top of the silo and is partially mounted from the same tripod. It permits movement of the distributor into or out of the trajectory of the material being conveyed into the silo and renders the distributor readily accessible for repair or removal. In order to facilitate filling of the upper portion of the silo, not only the distributor but also the collapsible guide means is movable out of the path of the material being put into the silo, permitting the silo to be filled considerably nearer to capacity than previous units of this type. An object of this invention is to provide an improved means for supporting a distributor for particulate material such as silage in a container such as a silo.

A further object of this invention is to provide supporting apparatus for a distributor for particulate material which is movable toward and away from the center of the container and means for moving the collapsible portion of a guide means or gooseneck in response to predetermined movement of the distributor carrying means.

Another object of the invention is to provide a support apparatus as aforesaid wherein the gooseneck extends generally toward the center of the silo and has a collapsible portion at its inner end movable between an extended position and a retracted position and wherein movement of the distributor carrying means to a position wherein the distributor is disposed substantially at the center of the silo moves the collapsible portion to its extended position.

Another object is to provide a supporting apparatus as aforesaid wherein latching means maintains the collapsible portion in its extended position permitting movement of the distributor carrying means toward and away from the center of the silo while the collapsible portion of the gooseneck is maintained in its extended position to permit direct filling of the center of the silo, and further means responsive to movement of the distributor carrying means to a predetermined position, spaced away from the center position, to effect movement of the collapsible guide means to its collapsed position.

Another object of the invention is to provide a support means for a silage distributor wherein it may be permanently mounted in a silo without interfering with vertical movement of a centrally suspended silo unloader.

Another object of the invention is to provide a support means for a distributor for particulate material which may be disposed generally centrally of a container but which renders the distributor readily accessible for removal or service.

Another object of the invention is to provide support means for a distributor as aforesaid wherein the distributor may be selectively moved into and out of the path of material being directed into the container, this movement being controlled by means remotely located from the distributor.

Still another object of the invention is to provide a support structure as aforesaid which is relatively simple and easily installed and which provides maximum flexibility to permit filling of the container near to its full capacity.

These and other objects will become apparent upon reading the following detailed description of a preferred embodiment of the invention.

BRIEF DESCRIPTION OF DRAWING

FIG. 1 is a perspective view as seen generally from the top of a tower silo having mounted therein a support apparatus embodying the present invention.

FIG. 2 is a side view of the tower silo and support means with portions broken away from clarity.

FIG. 3A is a fragmentary view in perspective, disclosing in detail a portion of the support apparatus and particularly disclosing a latching means which forms a part of the invention, this means being disclosed in its latched position.

FIG. 3B discloses substantially the same structure as disclosed in FIG. 3A except that the latch means is disclosed in the position it occupies when it is substantially unlatched.

FIG. 4 is a fragmentary perspective view disclosing in detail a carriage means which forms a part of the support structure of the present invention.

FIG. 5 is a fragmentary side view of the support structure disclosing a collapsible material guide means in its collapsed position and a distributor carrying means in its retracted position.

FIG. 6 is a fragmentary top view disclosing the distributor carrying means in its fully retracted position with the distributor carried thereby disposed in a position to facilitate service or removal thereof.

FIG. 7 is an exploded perspective view of a dolly which forms a part of the invention.

DETAILED DESCRIPTION

Referring to the drawing, reference numeral 10 refers generally to a tower silo of generally circular cross section. An upstanding supporting tripod is disposed thereabove and includes legs 11a, 11b and 11c each having one end provided with a conventional foot resting on the top edge of the silo. The opposite ends of the legs are joined by appropriate means at a position above and substantially at the center of the silo. This tripod is preferably of the type commonly used for suspending silo unloaders in tower silos of the type disclosed. An idler pulley 12 is mounted on one of the legs substantially at the center of the silo and is used as an idler for a cable 13 from which is suspended a silo unloader 14 (shown schematically in FIG. 2), which may be constructed, for example, according to the disclosure of applicant's issued U.S. Pat. Nos. 2,794,560, 2,877,907 or 3,301,412. The opposite end of cable 13 normally extends to the edge of the silo where it passes over another idler (not shown) and extends downward to a winch (not shown) which may be operated to move the silo unloader vertically, substantially at the center of the silo. It will be appreciated that when the unloader 14 is to be used to remove material from the silo, it will be lowered to a position on the surface of the silage. When the silo is to be filled, the unloader will be elevated to its uppermost position so that it will be out of the way and not interfere with the filling. In FIG. 1 unloader 14 and cable 13 have been omitted for the sake of clarity since the unloader actually forms no part of the present invention and it is shown schematically in FIG. 2 simply to show its spacial relationship with the support structure which is the subject of this invention.

Mounted on the outside of the silo is a vertically extending fill pipe 15 which extends upward to a position near the top of

the silo. It will be appreciated that fill pipe 15 extends downward to a position near the bottom of the silo where it will be connected to the output of a silage blower or the like (not shown). At its upper end fill pipe 15 has connected thereto a transition member 16 which in turn has connected thereto a gooseneck or guide means 17 for the silage or other particulate material. This gooseneck extends generally radially toward the center of the silo and terminates at a position short of the center of the silo. At this position it is connected to a supporting yoke 20 which is suspended by appropriate means from an arcuate frame member 21 connected between legs 11b and 11c of the tripod. Thus yoke 20 is displaced from the center of the silo. Attachment of gooseneck 17 to transition member 16 and to yoke 20 fixes it in position and it may therefore be referred to as a "fixed guide means" for the material which is to be put into the silo. Preferably gooseneck 17 is an articulated member made up of a plurality of sections such as the three sections 17a, 17b and 17c disclosed. This, and flexible adjustment in the connection between transition 16 and filler pipe 15, may render a single gooseneck usable with varying diameters of silos since the curvature can thus be varied. At the inner end of gooseneck 17, and hinged thereto as by pins 22 which may also provide the connection between the gooseneck and yoke 20, is a collapsible portion 23 of the guide means. At its remote end portion 23 has an additional guide or deflector means 24.

Disposed immediately below fixed guide means 17 and extending from the wall of silo 10 generally radially toward the center are a pair of spaced generally parallel rails 25 and 26 which provide a track for a movable carriage 27 having an extending arm 30 upon which is mounted a silage distributor 31. Also movably mounted on tracks 25 and 26 is a dolly 32 having a pair of spaced parallel legs 33 and 34 pivotally connected by appropriate means such as a pin 35 to the remote end of collapsible portion 23 of the guide means. As seen in the drawing, pin 35 (it will be appreciated that a single pin 35 may extend through both legs 33 and 34 and through both sides of portion 23 or that two shorter pins may be used, one for each of the legs 33 and 34) may also connect deflector means 24 to collapsible guide means 23. A cable 36 extends from a hand crankable pulley apparatus 37 mounted on the silo, near the bottom thereof, by appropriate means such as a U-clamp 38 connecting it to a hoop 44, over an appropriate pulley 39 and radially along rail 25, is connected to carriage 27 and then passes over a pulley 40 and extends back radially along rail 25, over an idler pulley 41 mounted at the outside wall of the silo and back down to crank member 37. Operation of crank member 37 from its remote location, which is convenient for the operator, results in movement of carriage 27 back and forth along the track provided by rails 25 and 26.

As best seen in FIGS. 1 and 2 rails 25 and 26 are mounted, adjacent the wall of the silo, by appropriate means such as vertically extending angle members 42, one of which is disposed on each side of filler pipe 15, and which extend to a position somewhat above the top of the silo wall. Members 42 may be secured to the silo by appropriate means such as U-clamps 43 which mount the angle members on the silo hoops 44. Idler pulleys 39 and 41 are rotatably mounted on one of the members 42 slightly above the top of the silo wall. Slightly above this point, preferably adjacent the top end of members 42, rails 25 and 26 are attached by appropriate means so that these rails are thus supported in this manner adjacent the wall of the silo and by yoke 20 adjacent the inner end of the rails. As can be seen in FIG. 1, these rails may be connected by a spacer member 45 intermediate the wall and the inner end. This structure is further rigidized by the use of a pair of inclined braces 46 and 47 connected between the yoke (at a position substantially upward from the point where it connects to the rails) and the rails at a position intermediate their two ends. As can best be seen in FIGS. 3A and 4, rails 25 and 26 actually include two members. For example, rail 25 includes a U-shaped channel member 25a laid on its side so that the open side of the channel faces outwardly and an L-shaped angle

member 25b having one leg lying partially across the top leg of channel member 25a and bolted thereto and having its other leg extending downwardly and in spaced relationship to the open end of channel member 25a. Similarly, rail 26 includes a U-shaped channel 26a and an L-shaped angle member 26b.

Carriage 27 can best be seen in FIGS. 4 and 7. As seen there, the carriage includes two triangular outside frame portions 50 and 51. These frame portions may be constructed, for example, by welding three members 50a, 50b and 50c to form a right triangular member 50 with legs 50a and 50b intersecting at a right angle and leg 50c providing the hypotenuse of the triangle. Similarly, legs 51a and 51b are formed to intersect at a right angle and leg 51c forms the hypotenuse of the triangle. A crossbar 52 is welded between the corner formed by the intersection of legs 50a and 50c on member 50 and the corner formed by the intersection of 51a and 51c on member 51, spacing the frame members 50 and 51 so that frame member 50 may be disposed between members 25a and 25b of rail 25 while frame member 51 is disposed between members 26a and 26b of rail 26. A second crossbar 53 is welded between legs 50a and 51a at a point somewhat above their midpoints but short of the top end thereof. An eyelet 53a on bar 53 is used to connect cable 36 to the carriage. Welded to crossbars 52 and 53 is a vertically extending cylindrical sleeve 54 which receives the upstanding leg of arm 30 which has a collar 55 secured to its upper end by appropriate means such as a bolt 56 passing therethrough to maintain the arm in sleeve 54 but rendering it rotatable therein. Welded to collar 55 and extending generally tangentially to the outer edge thereof is an arm 57. When arm 30 is in the position disclosed in FIG. 4, wherein it extends generally radially of the silo, arm 57 extends generally parallel to cross bar 53 and a pin 60 is placed through a hole near the end of arm 57 and down through a cooperating hole in crossbar 53 to secure arm 30 in this position. However, pin 60 may be removed rendering arm 30 rotatable with respect to sleeve 54 so that the distributor carried by arm 30 is more accessible for service or removal.

Carriage 27 is provided with a pair of wheels or rollers 61 and 62 mounted at the corners formed by the intersection of legs 50a and 50b and by the intersection of legs 50b and 50c, respectively, and these rollers extend inwardly from frame member 50. Similarly frame member 51 is provided with a pair of rollers or wheels 63 and 64 mounted thereon at the corners formed by the intersection of legs 51a and 51b, and by 51b and 51c, respectively and these rollers also extend inwardly from the frame member. As can be seen in FIG. 4, these rollers are adapted to roll on the upper surface of the lower leg of the U-shaped channels 25a and 26a or rails 25 and 26 while frame members 50 and 51 are disposed between members 25a and 25b and between members 26a and 26b, respectively. It will be appreciated that the carriage must be placed on the U-shaped channels before they have their L-shaped cooperating members attached thereto or it must be inserted from the end of the rails before they are secured to their supports. L-shaped members 25b and 26b not only assure that the carriage will remain on the rails but also aid greatly in precluding silage or other foreign materials from getting on the tracks and interfering with the movement of the carriage back and forth along the rails.

At the upper end of leg 50a, which extends generally vertically when the carriage is mounted on the rails, is a flat tab 65 which extends both slightly forward and slightly inward from the top of leg 50a. The purpose of this tab will be seen in the subsequent description of a latching apparatus which forms a part of the invention.

As best seen in FIGS. 3A and 3B, dolly 32 includes the two parallel legs 33 and 34 previously referred to, which extend forward between the legs of yoke 20. Legs 33 and 34 are joined by a crossmember 70 which extends beyond legs 33 and 34 on each end. At each end crossmember 70 has a forwardly extending portion which in turn has an upstanding leg. For example, member 70 has, adjacent rail 25, a forwardly extending member 71 and an upstanding leg 73, and adjacent rail 26 has

a forwardly extending portion 72 and an upstanding leg 74. Legs 73 and 74 are spaced so that they may be disposed between members 25a and 25b of rail 25, and between channel members 26a and 26b of rail 26, respectively. Mounted at the upper end of legs 73 and 74 are rollers 75 and 76, respectively. These rollers extend inwardly from legs 73 and 74 and are adapted to roll on the upper surface of the bottom leg of channel members 25a and 26a, respectively. As indicated, the remote ends of legs 33 and 34 are connected by appropriate means such as a cross pin 35 to collapsible guide portion 23. It will thus be appreciated that movement of dolly 32 back and forth along rails 25 and 26 will result in movement of collapsible portion 23 with respect to fixed guide means 17. As can be seen in FIGS. 1 and 2, when collapsible guide portion 23 is in its extended position, substantially in continuous extension of the fixed guide means, legs 33 and 34 are substantially horizontal. When collapsible portion 23 is moved to a collapsed, substantially vertical position, as shown in dashed lines in FIG. 2, and as shown in FIG. 5, dolly 32 will have to be moved toward the wall of the silo and legs 33 and 34 will be inclined downwardly from the rails.

Upstanding leg 73 also has mounted thereon, preferably about the same pin which provides an axle for roller 75, a latch member 80. Latch member 80 is formed generally in the shape of a right triangle with substantially a right angle being formed between the top edge and the back edge and with the hypotenuse lying on the under side. As indicated, latch member 80 is rotatably mounted about a pin which has been designated by numeral 81, mounted on upstanding leg 73. This pivot point is formed near the right angle corner of latch member 80 which, as seen in FIG. 3A is near the upper rear corner of the latch member. This causes the latch member to tend to rotate in a counter clockwise direction due to its own weight. A tab 82 extends laterally from the bottom rear corner of latch 80 and extends under the bottom leg of U-shaped channel member 25a to preclude counterclockwise rotation of latch member 80 beyond substantially the position disclosed in FIG. 3A wherein the top surface is substantially horizontal. Approximately midway along the hypotenuse or under side of latch member 80 it has formed therein a slot 83 which is cooperable with a latch pin 84 which extends outwardly and generally horizontally from the left-hand leg of yoke member 20. Rotatably mounted on the same left-hand leg of yoke member 20 is a latch disabling bar 85, rotatable about an appropriate pivot 86 substantially at its midpoint and having, at its upper end, a transversely extending leg 85a which is engageable with the end of latch member 80. At its other end, member 85 has a transversely extending tab 85b which has a hole therethrough through which cable 36 passes. An appropriate clamp or abutment means 90 is adjustably mounted on cable 36 for engagement with tab 85b in a preselected position of the cable, and thereby of the carriage and the distributor carried thereby.

The particular kind of distributor utilized is not critical to this invention but one which has found considerable application recently has been disclosed. It includes an electric motor 91 driving an appropriate spinner plate 92 which is mounted above the motor and which has appropriate baffles so that silage or other particulate material deposited thereon from the end of the gooseneck will be distributed substantially evenly around the silo. An appropriate electrical cable 93 is provided and this may be secured by appropriate means such as clamps 94 and then suspended over an appropriate hook 95 mounted on the side of gooseneck 17 substantially at its midpoint so that a minimum amount of cable is used but yet carriage 27 can be moved back and forth along the rails without the cable interfering with its movement. Cable 93 extends to the edge of the silo and to a position where it will be connected to an appropriate source of electrical power.

The operation of the support apparatus is as follows. Distributor 31 is removably mounted by appropriate means on the remote end of arm 30. Arm 30 is then rotated to a position where it extends generally parallel to rails 25 and 26 and thus

generally radially of the silo. It is locked in this position by means of pin 60 extending through arm 57 and cross bar 53 of the carriage. Operation of the crank of apparatus 37 results in movement of the carriage, and thereby the distributor, back and forth toward and away from the center of the silo. For purposes of illustration, it will first be assumed that the carriage is disposed substantially at the wall of the silo and that dolly 32 is moved away from its end position, toward the wall of the silo and collapsible portion 23 is in its collapsed position as disclosed in FIG. 5. Crank apparatus 37 is operated to move the carriage toward the center of the silo. Eventually the carriage will overtake the dolly and will engage it and move it toward the center of the silo causing collapsible portion 23 to be moved in a counterclockwise direction from its collapsed position towards its extended position. At this time, tab 65 on the upper end of leg 50a of the carriage engages the upper rear corner of latch 80 urging it in a counterclockwise direction. However, tab 82 on latch member 80 is disposed underneath the bottom of rail member 25a and limits the amount of counterclockwise rotation of latch 80. As the dolly approaches the inner end of rails 25 and 26, the underside of the latch comes upon latch pin 84 which cams the latch upward in a clockwise direction and rides along the underside of the latch until it reaches the slot 83 whereupon the force applied by tab 65 to latch 80 causes it to rotate in a counterclockwise direction so that latch pin 84 is disposed in slot 83. This will define an innermost position for dolly 32 and carriage 27 and will be a position wherein dolly 32 is substantially at the inner end of the rails. At this position collapsible portion 23 will be in its extended position preferably substantially in continuous extension of fixed guide means 17. Also in this position distributor 31 will be located substantially at the center of the silo and substantially directly under collapsible guide means 23 whereby material guided thereby will be directed substantially onto the center of the distributor.

Since dolly 32 is now latched in this end position, crank apparatus 36 may again be operated to move carriage 27 away from its end position and toward the wall without effecting the position of the dolly and the collapsible guide means. This permits movement of the distributor back and forth under the gooseneck or guide means as desired and, preferably, permits the distributor to be moved all of the way out from under collapsible portion 23 so that the silage or other material may be run directly into the silo without impinging upon the distributor in order to directly fill the center of the silo when desired. Clamp 90 is placed in a position on cable 36 so that when carriage 27 is moved to a position near the wall of the silo, clamp 90 engages tab 85b on arm 85 and further movement of the cable moving carriage 27 further toward the wall results in clockwise rotation of arm 85. This causes tab 85a thereon to engage the upper end of latch 80 and lift it causing latch 80 to rotate in a clockwise direction eventually lifting it from latch pin 84. This action thus disables the latch and releases dolly 32. Due to gravity, collapsible portion 23 then moves downward pushing dolly 32 toward the wall of the silo away from this innermost position. As explained previously, when in this position, the entire support means, including the collapsible guide means and the dolly are disposed far enough from the center of the silo so that silo unloader 14 may be moved vertically past the inner end of the support apparatus without any interference therefrom. It will be noted that this can be accomplished by turning the silo unloader substantially at right angles to the support apparatus. Then it can be raised to the top of the silo conveniently and again lowered after the silo has been filled.

When the carriage is moved substantially to the wall and collapsible portion 23 is in its collapsed position, it may then be moved manually to a further retracted position folded back substantially along the underside of fixed guide means 17, as shown in dashed lines in FIG. 5. In this position material being guided by fixed guide means 17 can issue from the end thereof without any interference from the collapsible portion. This is useful in the event that, when the silo is substantially filled, it is

desired to add some additional material to the side of the silo opposite the support means for the silage distributor.

When it is again desired to move the distributor to the center of the silo and to extend collapsible portion 23 it is only necessary to operate crank apparatus 37 and again carriage 27 will engage dolly 32 moving the dolly and the remote end of collapsible portion 23 toward the center of the silo and eventually latching it in this position. When it is desired to remove or service the distributor, the carriage is simply retracted to a position adjacent the wall of the silo and pin 60 is removed permitting rotation of arm 30 to a position wherein the distributor is disposed adjacent the wall of the silo where it is readily accessible.

From the foregoing it can be seen that a relatively simple support apparatus for a silage distributor or the like has been provided which does not interfere with the movement of a suspended silo unloader and it can therefore be permanently mounted in the silo. The apparatus can be operated remotely from a convenient position near the ground. The collapsible portion is automatically moved between its extended and collapsed positions by simple operation of the crank apparatus to move the carriage. The apparatus is even flexible enough so that the collapsible portion itself can be moved to a position out of the way of the trajectory of the material being put into the silo to allow optimum filling. Service and removal of the distributor is relatively simple because it can be moved adjacent the wall. Many advantages provided by this new structure can thus be readily appreciated.

It will also be appreciated that while this apparatus has been described in connection with a tower silo for use in distributing silage, it is equally applicable to various other types of storage containers and to various other types of particulate material which should be spread evenly. Various changes and modifications may be apparent in view of the disclosure herein and it is therefore intended that this disclosure be by way of example only and not by way of limitation.

We claim:

1. Apparatus for supporting a distributor for distributing particulate material in a storage container comprising: frame means including means extending at least a portion of the way across the container; distributor carrying means movably mounted on said frame means; fixed guide means for receiving and guiding moving material and having a material receiving end and a remote end; collapsible guide means for receiving material from said fixed guide means; means hingedly connecting the collapsible guide means to the remote end of said fixed guide means for movement between an extended position and a collapsed position with respect thereto; and means responsive to predetermined movement of said distributor carrying means on said frame means to effect movement of said collapsible guide means between its extended and collapsed positions.

2. The apparatus of claim 1 wherein said frame means includes means extending substantially from a wall of the container and generally toward the center thereof; said fixed guide means has its receiving end generally adjacent a wall of the container and its remote end extending generally toward the center of the container; and said distributor carrying means is movable on said frame means generally towards and away from the center of the container.

3. The apparatus of claim 2 wherein the distributor carrying means is movable between a first position substantially adjacent a wall of the container and a second position wherein a distributor carried thereby will be positioned substantially centrally of the container; the collapsible guide means, when it is extended, is disposed to direct material guided thereby to substantially the center of the container and onto a distributor carried by said distributor carrying means; and said means responsive to movement of said distributor carrying means includes means operable to move said collapsible portion to its extended position when said distributor carrying means is moved to its second position and means for maintaining said collapsible portion in its extended position upon

movement of said distributor carrying means away from said second position, and further means operable for effecting movement of said collapsible portion to its collapsed position upon movement of said distributor carrying means to a predetermined position intermediate the wall of the container and its second position.

4. The apparatus of claim 3 wherein the means responsive to movement of said distributor carrying means includes means for latching said collapsible guide means in its extended position when said distributor carrying means is moved to its second position and means for unlatching said collapsible portion only when said distributor carrying means moves to a predetermined position between the second position and the wall of the container.

5. The apparatus of claim 1 wherein the frame means and the fixed guide means both extend from adjacent a wall of the container toward generally the center of the container; and the means responsive to movement of said distributor carrying means includes means operable to move said collapsible portion to its extended position upon movement of said distributor carrying means to a predetermined position on said frame and maintain said collapsible guide means in said extended position until the distributor carrying means is moved to another predetermined position and is thereupon operable to effect movement of said collapsible guide means to its collapsed position.

6. The apparatus of claim 5 wherein said first predetermined position is closer to the center of the container than is said second predetermined position.

7. The apparatus of claim 5 including winch means having cable means operably connected to said distributor carrying means and operable to move said distributor carrying means back and forth along said frame means.

8. The apparatus of claim 5 wherein said distributor carrying means has a remote position wherein a distributor carried thereby is disposed substantially at the center of the container and said collapsible guide means, when in its extended position, is disposed to direct material substantially to the center of the container and onto the distributor; and wherein movement of said distributor carrying means to said remote position effects movement of said collapsible guide means to its extended position.

9. The apparatus of claim 8 including latch means operable to latch said collapsible guide means in its extended position upon its movement to said extended position and thereafter maintaining said collapsible guide means in said extended position unaffected by limited movement of said distributor carrying means back and forth along said frame means; and means responsive to movement of said distributor carrying means to a predetermined position intermediate the wall of the container and said remote position and operable to unlatch said collapsible portion to effect its movement to its collapsed position.

10. The apparatus of claim 5 wherein said second predetermined position is sufficiently spaced from said first predetermined position so that a distributor carried by said distributor carrying means is movable out of the path of material directed by said collapsible guide means in its extended position before said distributor carrying means reaches said second predetermined position.

11. The apparatus of claim 2 wherein said frame means includes a remote innermost end, the apparatus including suspension means having at least three legs and mounted on the walls of the container; means operably connecting the remote end of said frame means to said suspension means in supporting relationship thereon; and said frame means including means supporting said fixed guide means in a position above the distributor carrying means.

12. The apparatus of claim 11 wherein the frame means further includes sector means connected between two adjacent legs of said suspension means, yoke means connected to said sector means at a position intermediate said two legs of said suspension means and extending downward therefrom,

and means connecting said yoke means to the innermost end of said frame means.

13. The apparatus of claim 2 wherein said frame means extends inwardly to a position short of the center of the container; said fixed guide means extends inwardly to a position substantially aligned with the inner end of said frame means; said distributor carrying means includes means for positioning a distributor carried thereon substantially at the center of the container when disposed in an innermost position on said frame means; and said collapsible guide means, when in its extended position, is disposed to direct material substantially to the center of the container and onto the distributor carried by the distributor carrying means, and in its collapsed position, is disposed in a position short of the center of the container.

14. The apparatus of claim 13 wherein the remote end of said fixed guide means, the portion of said collapsible guide means which is connected thereto and the means hingedly connecting said collapsible means and said fixed guide means are all constructed and arranged so that said collapsible guide means is movable from its collapsed position to a retracted position wherein it extends generally backward underneath and generally in the direction of said fixed guide means, and clears the remote end of said fixed guide means when in said retracted position whereby material guided by said fixed guide means may be discharged directly from the remote end thereof without impinging upon said collapsible guide means.

15. The apparatus of claim 13 wherein the container is a tower silo and the inner ends of said frame means and of said fixed guide means are disposed in a position sufficiently short of the center of said silo to permit a silo unloader suspended substantially centrally of the silo to pass beyond the end thereof when said distributor carrying means is moved away from said inner end of said frame means and said collapsible guide means is in its collapsed position.

16. The apparatus of claim 2 wherein said frame means extends inwardly to a position short of the center of the container; and said distributor carrying means includes carriage means movable on said frame means toward and away from the center of the container, arm means including a portion extending from said carriage means and disposed in a generally horizontal plane which is generally parallel to the path of said carriage means on said frame means, means pivotally mounting said arm means on said carriage means for movement about said mounting means substantially in said plane, said arm means having mounting means for mounting a distributor at its remote end, one of said positions of said arm means being an extended position wherein it extends substantially inwardly toward the center of the container.

17. The apparatus of claim 16 wherein said carriage means has an innermost position on said frame means and, when said carriage means is in said innermost position and said arm means is in its inwardly extended position, a distributor mounted on said arm means is disposed substantially at the center of the container.

18. The apparatus of claim 17 wherein said arm means is movable about its pivotal mount to a position with respect to said carriage means wherein its remote end extends substantially backward along said track means, extending generally toward the wall of said container from said pivot, whereby, when said carriage means is moved to a position adjacent the wall of the container, said arm means can be rotated about said pivot to a position wherein a distributor mounted thereon is disposed substantially adjacent the wall.

19. Apparatus for supporting a material distributor in a generally cylindrical container such as a silo or the like comprising: frame means extending generally radially inward from one wall of the container; material guide means spaced above said frame means and extending from adjacent the wall, generally radially toward the center of the container and including a collapsible inner end portion near the center of the container; distributor carrying means mounted on said frame means and moveable thereon generally toward and away from the center of the container; means operable in response to

movement of said distributor carrying means to a position near the center of the container to move the collapsible portion of said guide means to its extended position and further operable thereupon to maintain said collapsible guide means in its extended position independently of the position of said distributor carrying means; and means responsive to movement of said distributor carrying means to a second predetermined position and operable thereupon to release said collapsible portion to allow it to move to its collapsed position.

20. Apparatus for mounting a particulate material distributor near the top of a container having an upstanding generally cylindrical wall, the apparatus comprising: frame means; means for mounting said frame means in the container in a position extending from adjacent the wall and generally radially toward the center of the container; fixed guide means; means for mounting said fixed guide means in a position extending from adjacent the wall and generally radially toward the center of the container; said fixed guide means being adapted to receive moving material and to guide it toward the center of the container; collapsible guide means; means hingedly connecting said collapsible guide means and said fixed guide means and rendering said collapsible guide means movable between an extended position and a collapsed position with respect to said fixed guide means; distributor carrying means movably mounted on said frame means and movable thereon generally radially of the container, toward and away from the center thereof; means responsive to movement of said distributor carrying means to a predetermined position and operable in response thereto to move said collapsible guide means to its extended position further means for maintaining said collapsible guide means in said extended position when said distributor carrying means is subsequently moved away from said first predetermined position; and further means responsive to movement of said distributor carrying means to a second predetermined position to effect movement of said collapsible guide means to its collapsed position.

21. The apparatus of claim 20 including suspension means having at least three legs adapted to be mounted on the wall of the container and to at least partially support said frame means, said suspension means also being usable to suspend means for unloading the container, and said frame means, said fixed guide means and said collapsible guide means being so disposed, when said collapsible guide means is in its collapsed position, that they are out of the path of vertical movement of an unloading means suspended centrally by the suspension means.

22. The apparatus of claim 20 wherein said distributor carrying means has an end position on said frame means wherein a distributor carried thereby is disposed substantially at the center of the container; said collapsible guide means, in its extended position, directs materials substantially to the center of the container and onto a distributor carried by said distributor carrying means in said end position; and said second predetermined position is spaced sufficiently far from said end position so that a distributor carried by said distributor carrying means can be moved radially into and out of the path of material directed by said collapsible guide means while said collapsible

guide means is maintained in its extended position.

23. The apparatus of claim 20 including winch means adapted to be mounted outside of the container in a position relatively near the bottom thereof and including cable means operably connected to said distributor carrying means, said winch means being operable to remotely move said distributor carrying means back and forth along said frame means.

24. The apparatus of claim 23 wherein the means for maintaining said collapsible guide means in its extended position includes latch means rendered operative when said collapsible portion is moved to its extended position, and said means responsive to movement to said second predetermined position includes disabling means operable to disable said latch means, and means carried by said cable means and effective to operate said disabling means when said distributor carrying means reaches said second predetermined position.

25. The apparatus of claim 20 wherein said distributor carrying means includes carriage means movable along said frame means and toward and away from the center of the container; and the apparatus further includes linkage means including a portion movable back and forth on said frame means substantially in the path of said carriage means and disposed inwardly from said carriage means and engageable by said carriage means as said carriage means moves towards the center of the container on said frame means, said support means being operably connected to said collapsible guide means whereby movement of said first portion of said support means from a first position on said frame means to a second position thereon and further toward the center of the container, moves said collapsible guide means from its collapsed position to its extended position.

26. The apparatus of claim 25 further including latch means including first and second cooperating members, one mounted on said frame means and the other on said movable support means, cooperable to latch said movable support means in a position on said frame means wherein said collapsible guide means is in its extended position.

27. The apparatus of claim 26 wherein the cooperating members of said latching means includes a latching pin on said movable support means and a cooperating movable dog means having a portion adapted to engage said pin means movably mounted on said frame means, said dog means having a portion engageable by said carriage means when said carriage means reaches said first predetermined position and is moved thereby to a position wherein said portion of said dog means engages said pin means.

28. The apparatus of claim 27 including cable means operably connected to said carriage means and remotely operable means connected to said cable means and operable to effect movement of said carriage means, unlatching means movably mounted on said frame means operable to engage said dog means and move said dog means to a position to unlatch the dog means from said pin means, and means carried by said cable means and engageable with said unlatching means when the cable is in a position wherein said distributor carrying means is in said second predetermined position to operate said unlatching means.

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